

Commitment of the Aesthetic Line of Ricketts and the Facial Profile in Patients with Open Bite without Growth

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Abstract

The objective of the present investigation was to evaluate the compromise of the aesthetic plane of Ricketts and the facial profile in patients without growth with open bite that go to the Dental Medical Center "Dr. Elinor Alvarado", Barquisimeto, Lara State. This study is located under the quantitative approach and as regards the nature of the work it is a descriptive field research. The population consisted of 70 patients. Through the intentional sampling, 10 non-growth patients with open bite malocclusion were selected, who underwent radiographic study of lateral cephalic skull and profile photographs. The cephalometric tracing included the Ricketts Aesthetic Plane and the NAPg angle; In turn, the anteroposterior facial profile was determined. After the analysis of the results, it was possible to conclude that there is a compromise of the aesthetic plane of Ricketts in patients without growth with open bite where a significant procheelia was observed, so it is recommended to include the study of this plane and the facial profile as a variable Routine diagnosis since it proved to be a reliable and determinant diagnostic tool in the proper treatment of this malocclusion.

Keywords: Open Bite; Patients without Growth; Cephalometry; Ricketts Aesthetic Plane; Facial Profile

Introduction

Open bite is described as the lack of evident contact between the upper and lower teeth manifested in the anterior region or posterior segments of the arch, or in both [1], another characteristic is the lack of occlusal contact of the opposing teeth When the jaws are closed [2]. This anomaly is usually associated with other changes in the dento-skeletal complex, which will make it more difficult to identify its etiology and the prognosis for its treatment.

Some specialists present different classifications of this type of malocclusion being one of the most accepted in the current that divides the problems in dental or skeletal [1,3]. The treatment is increasingly complicated by the difficulty of differentiating the possible dental and skeletal etiological factors that depend on the patient's growth pattern.

There are many factors involved in facial skull growth, among which we can mention: tongue growth, lips, cheeks, change in swallowing patterns, change in muscle actions, obstruction of the upper airways and in general a great diversity of morphological and anatomical variations that compromise the harmonic profile of the patient [1,4-6].

One of the objectives of the treatment of this pathology is to improve the facial harmony, so it is important to consider how alterations in the spatial relationships of the hard tissue inevitably produce alterations in the soft tissues [7]. Taking into account the facial aesthetics during the treatment plan is fundamental, so the soft profile should be analyzed, highlighting the importance of lip posture [8].

This observation was pointed out by Ricketts [10], who proposed two arbitrary points united by a line known as Ricketts' aesthetic plane extending from the tip of the nose to that of the chin. For this reason, balance and facial harmony should be included in the diagnosis and treatment plan to achieve functional occlusion and dentofacial aesthetics [9,10].

The diagnosis and treatment of open bite has been and is one of the most controversial pathologies in dentistry, despite multiple studies, research and clinical experiences.

The knowledge of the facial profile in people with open bite is a great help for the treatment plan approach which is not only well-aligned dental arches and an optimal occlusal relationship, but also achieve a well-balanced and proportional face that satisfies the aesthetic needs of the patient [9].

In Venezuela, work has been done such as that of Gervasio and Gómez in which the relationship between the cephalometric angle NAP and the values of the Ricketts Aesthetic Line was evaluated. For this, two patients were taken to whom orthodontic-surgical treatments were assigned for their dento-skeletal conditions. The obtained data allowed to determine that there is certainly a great influence of the cephalometric angle NAP on the values of the Ricketts Aesthetic Line in the patients studied [11].

The present study aims to determine the commitment of the Ricketts aesthetic plane and the facial profile as a tool for the diagnosis and treatment plan of the open bite in patients without growth that go to the Dental Medical Center "Dr. Elinor Alvarado", Barquisimeto, Lara State.

Materials and Methods

The present study is part of the research field nature under the quantitative approach and descriptive transsectional design. The population consists of all patients without growth with open bite attending the Dental Medical Center "Dr. Elinor Alvarado", Barquisimeto, Lara State, during the period 2010 - 2011 corresponding to 70 patients. The study sample comprised of 10 patients without growth was selected through the technique of intentional sampling and obeyed the following inclusion criteria previously established by the author: patients with open anterior bite $> 0 = 1$ mm, patients who had not received Even treatment, patients with no growth (Female over 16 years of age and male over 18 years of age), patients with lateral cephalic skull in their file. We included all patients who came to the medical center who did not present any of the following exclusion criteria: patients without diagnosis of open bite, patients with previous treatment, patients in growth, patients who do not have in their clinical records with cephalic lateral skull.

Subsequently, the 10 medical records of the selected patients were reviewed, who previously approved their participation in that study. In addition, 10 lateral cephalic x-rays of Kodak skull were taken with a team of digital radiographs Villa Sistemi Medicali, model Rotograph EVO and a team of lateral radiographs brand Panorex.

The cephalometric trace of the aesthetic plane of Ricketts was realized in leaves of vegetal paper brand gvarro 21.5 x 28cms and of 90 / 95gms, with a pencil of mines HB 0.5. Linear measurements were obtained by the use of a x-ray to locate anatomical structures more easily on x-rays.

The cephalometric points that were used were taken according to the anatomical structures of the patient, located in soft tissue, the tip of the nose and the tip of the chin, the union of these two points form the aesthetic plane of Ricketts, For upper lip -4 mm and lower lip -2 mm. Any altered value indicates retroquelia or proquelia.

To describe the cephalometric facial profile, the points Nasion (N) point located at the intersection of the naso frontal suture, Point A (A) deepest point of the anterior border of the maxillary bone, Pogonio (Pg) The most anterior point of the contour of the mandibular symphysis, is the most anterior part of the lower jaw. They were then joined at an angle (NAP), which was used to determine whether a

straight (0°), concave (< 0°) or convex (> 0°) profile was described.

On the other hand, the photographic facial profile of the selected patients was determined through profile photos printed on Kodak paper; three anatomical points were located: glabella, subnasal point and chin, which, when united, formed an angle that according to the degree Which it expresses, will determine whether it is a straight, concave or convex profile.

The data collection instrument consists of the clinical records of the patients without growth with previous open bite selected, from which the variables were extracted in an observation guide designed according to the specific objectives. Once the information was collected, tabulation and analysis were performed using the SPSS version 15.0 statistical package.

As analysis technique, relative frequency measures were used as percentages and measures of central tendency and dispersion as mean and standard deviation. In addition, the Student Test was performed to compare the values established by Ricketts and to determine the statistical differences between classes ($p < 0.05$ and 95% confidence).

Results

Based on the objectives of the research, data analysis was performed. The tables below describe the results obtained.

We studied a group of patients without growth (n = 10) in which it was observed with respect to age, that fifty percent (50.0%) of the participants were in the group of 16 - 18 years. The mean age was 20.70 ± 7.5 . It should be noted that all the people who participated in the research were female (Table 1).

Age group (Years)	* No.	%
16 - 18	5	50
19 - 21	2	20
22 - 24	1	10
25+	2	20
Total	10	100

Table 1: Distribution of participants according to age. Dental Medical Center "Dr. Elinor Alvarado". Barquisimeto, Lara 2013.
* Average age = 20.70 ± 7.5

The Ricketts Superior Aesthetic Line was analyzed, where it is observed that it is altered in a 20.0% in the scale of -6 to -5 mm; 40.0% between -3 to 0 mm and 40.0% between 1 - 6 mm, considering these values as indicators of proquelia.

There were statistically significant differences ($p < 0.05$) between the values of the Superior Aesthetic Line, taking as reference the normal value -4 mm indicated by Ricketts. The mentioned information can be evidenced in Table 2.

Superior Aesthetic Line * (mm)	No.	%
- 6 to -5	2	20
-3 to 0	4	40
1 to 6	4	40
Total	10	100

Table 2: Superior Ricketts Aesthetic Line of participants. Dental Medical Center "Dr. Elinor Alvarado", Barquisimeto, Lara State, 2013.
* $t_{(89)} = 2.951; P = 0.016$

In relation to the compromise of the inferior Ricketts aesthetic line, this one is altered in a 40,0% in the scale of 0 to 2 mm and 50,0% in the scale 3 - 6 mm, being considered these values like indicators of proclia.

Statistically significant differences ($p < 0.05$) were observed between the values of the Lower Aesthetic Line, taking as reference the normal value -2 indicated by Ricketts (Table 3).

Lower Aesthetic Line * (mm)	No.	%
- 3 to -1	1	10
0 to 2	4	40
3 to 6	5	50
Total	10	100

Table 3: Ricketts Aesthetic Line Bottom of the participants. Dental Medical Center “Dr. Elinor Alvarado”, Barquisimeto, Lara State, 2013.

$$* t_{(9df)} = 4.666; P = 0.001$$

In the present study, 60.0% of the patients presented values of $< 165^\circ$, which indicates a convex facial profile, 20.0% of the patients presented values $> 175^\circ$, indicating a concave facial profile And $165^\circ - 175^\circ$ a straight facial profile, respectively (Figure 1).

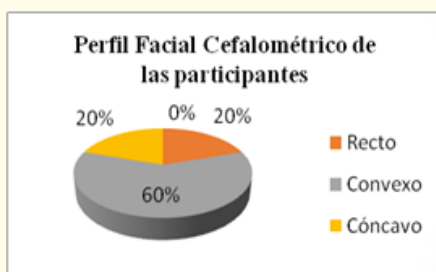


Figure 1: Photographic facial profile of the patients. Dental Medical Center “Dr. Elinor Alvarado”, Barquisimeto, Lara State, 2013.

Regarding the cephalometric facial profile, it was possible to show what was indicated in the previous paragraph when 60.0% of the patients had a convex facial profile; 20.0% of the patients had a straight and concave facial profile, respectively (Figure 2).

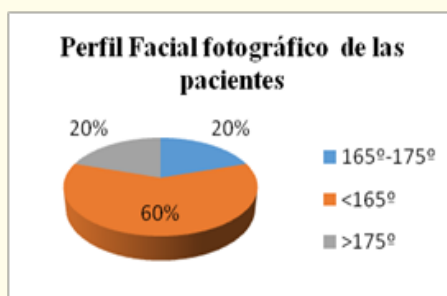


Figure 2: Cephalometric Facial Profile of the participants. Dental Medical Center “Dr. Elinor Alvarado”, Barquisimeto, Lara State, 2013.

Regarding the study of the relationship between the Ricketts’ Superior Aesthetic Line and the Face Profile, it is important to note that 50.0% of patients with retrochelia (-6 to -5) had a straight and concave facial profile, respectively. Likewise, patients with prochelia located in the class (-3 to 0) in 50.0% had a straight facial profile and 33.3% convex. 66.7% of the class (1 to 6) had a convex facial profile.

When comparing means for independent samples (t-student), a statistically significant difference was observed between the Ricketts’ Superior Aesthetic Line and the Facial Profile (p < 0.05) (Table 4).

Superior Aesthetic Line (Mm)	Facial Profile		
	165° - 175° N %	<165° N %	≥ 175° N %
-6 to -5	1 50.0	0 0.0	1 50.0
-3 to 0	1 50.0	2 33.3	1 50.0
1 to 6	0 0.0	4 66.7	0 0.0
N = 10			

Table 4: Superior Aesthetic Line according to the Facial Profile of the participants. Dental Medical Center “Dr. Elinor Alvarado”, Barquisimeto, Lara State, 2013.

$$* t_{(99)} = 3.84; P = 0.005$$

Likewise, the analysis of the values observed in the present study shows that 100% (6) of the patients with convex facial profile (< 165°), 66.7% (4) of the class (3 to 6) and 33.3% (2) of the class (0 to 2) presented prokelia.

A marginal difference between the Ricketts Inferior Aesthetic Line and the Face Profile was evidenced. When comparing means for independent samples (t-student), a statistically marginal difference was observed between the Lower Aesthetic Ricketts Line and the Face Profile (p = 0.063) (Table 5).

Lower Aesthetic Line (mm)	Facial Profile		
	165° -175° No %	<165° No %	≥ 175° No %
-3 to -1	1 50.0	0 0.0	0 0.0
0 to 2	1 50.0	2 33.3	1 50.0
3 to 6	04 0.006	1 6.7	50.0
N = 10			

Table 5: Lower Aesthetic Line according to the Facial Profile of the participants. Dental Medical Center “Dra. Elinor Alvarado”, Barquisimeto, Lara State, 2013.

$$* t_{(99)} = 2.159; P = 0.063$$

Discussion

Once exposed the results were analyzed and attempted to compare them with other studies that have been published and collected according to the literature review.

The present investigation was carried out in patients without growth of the Dental Medical Center Dr. Elinor Alvarado, Barquisimeto state Lara. Where one of the difficulties was to find sufficient numbers of patients with open bite according to the previously mentioned

inclusion criteria, given that this type of pathology is not as frequent as stated in Kelly's study, cited by Canut [1], who pointed out that the American population shows a prevalence of 3.5% between the white population and 16.5% among the black population [1]. Likewise, Proffit cited by Canut (Ob.cit), registered a prevalence of 3.5% in subjects of 8 - 17 years of age [1], finally Kantorowitz cited by the same author, observed that 4.2% Of a group of 6-year-old children had an open bite and yet only affected 2.5% of another 14-year-old group [1]; This means that it is foreseeable to find almost twice as many open bites at 6 years as at 14 because of sucking and swallowing habits.

In the study there was predominance of the female sex (100%). This is due to the usual concern of women for aesthetics and oral care. We also found a greater number of patients in the age group of 16 to 19 years; Stage of life where physical appearance plays an important role in the development of self-esteem. According to data from a study conducted in the United States by Brunelle, *et al.* [12], 9.4% of children between 8 and 11 years old, 24.9% between 12 and 17 years old, and 18.6% of adults between 18 and 50 years old receive orthodontic treatment. Percentage of women than men [12].

Since there are different variables described and used to measure the soft profile, the first step in this work was to select the variables to be treated. The aesthetic plane of Ricketts or E-line was chosen, aesthetic line extended from the soft tissue of the tip of the nose to the soft tissue of the chin.

The values of the E-line or aesthetic plane of Ricketts, both upper and lower, were calculated in the study group, patients with anterior open bite, with statistically significant differences ($p < 0.05$) between the values of the Upper Aesthetic Line Taking as reference the normal value -4 mm indicated by Ricketts. Likewise in the inferior one taking as reference the value -2 mm.

The analysis of the facial profile is an important parameter to consider within the orthodontic diagnosis that allows to determine in a relatively easy way the type of growth that an individual can present, also considered as the first indicator in the identification of skeletal alterations from a clinical point of view.

In the study of dentofacial anomalies, the cephalometric analysis allows visualization of alterations of the type of profile. This allows to evaluate the importance of the interrelation of the structures of the face of the individual and their functional and harmonious appearance. This is why cephalometric analysis can be considered of great importance in the diagnosis [13]. In the present investigation, it was possible to evidence what was indicated in the previous paragraph when 60.0% of the patients had a convex facial profile; 20.0% of the patients presented a straight facial profile and 20% concave.

Regarding the study of the relationship between the Ricketts Aesthetic Facial Line (Upper and lower) and the Facial Profile, it is important to note that this study yielded the following results: 50.0% of patients with retrochelia presented a straight facial profile and Concave, respectively. These results correlate with that reported by Montoya, *et al.* in patients before undergoing treatment [14].

Finally, it is important to note that there are few studies with which the results of the present study can be compared. Many researchers have studied changes in the profile of soft tissues in relation to the treatment plan with or without extractions, or depending on the technique of treatment, it is expected that this will serve for future studies.

Conclusion

The results obtained in the present study lead to the following conclusions:

- According to the sex characterization, a female sample was found, which suggests a higher prevalence of open bite in this genus. It is also more common in the ages of 16 - 18 years.
- As to the type of open bite, a malocclusion was determined that only compromises the anterior sector in the patients who attend the Dental Medical Center "Dr. Elinor Alvarado".

- The predominant facial profile among the sample studied was the convex in a significant percentage being this 60% in comparison with the straight and concave profiles. In turn, it was observed that both the analysis of the facial and cephalometric facial profile coincided with the same results.
- According to the results obtained, it can be evidenced that there is great compromise of the aesthetic plane of Ricketts in patients without growth with open bite that go to the Dental Medical Center “Dr. Elinor Alvarado”, where a significant proclia was observed in a percentage of 80% higher and 90% lower; Which is a determinant diagnostic variable in the adequate treatment of these patients. It is important to remember that, as well as obtaining an excellent occlusal relationship, it is also extremely important to ensure a correct aesthetic, where the facial profile plays a fundamental role.
- A statistically significant difference of $p = < 0.05$ was observed in relation to the values of the aesthetic line of upper and lower Ricketts referred by the author (-4 mm and -2 mm) respectively.

Bibliography

1. Canut J. “Clinical and Therapeutic Orthodontics”. *Open Bite* 25 (2000): 495-513.
2. Proffit W and Fields W. “Contemporary Orthodontics Theory and Practice”. Malocclusion and Dentofacial Deformity in Today’s Society 1 (2001): 10-13.
3. Richardson A. “Classification of open bites” (1981): 289-296.
4. Cueva A Marichi., *et al.* “Determination of changes in the soft profile of the lower facial third when removing the fixed orthodontic appliance”. *Revista Odontológica Mexicana* 13.1 (2009): 31-36.
5. Moyers R. “Manual of Orthodontics”. Pan American Medical Publishing House (4th Edition) 15 (1992): 343-365
6. Vergaray A. “Evaluation of the skeletal and dental characteristics of atypical deglutition patients according to skeletal pattern”. Thesis presented at the Faculty of Dentistry of the National University of San Marcos, Lima Peru (2009).
7. Suárez Lorenzo J and González Antequera A. “Orthodontics in Adults”. Editorial UNR, Rosario – Argentina (1999).
8. Dottori L Griffiths and M Marco V. “Facial Convexity of the Ricketts Cephalogram and Sagittal Analysis of the Soft Profile of the Lower Third. Electronic Edition”.
9. Ricketts R. “Planning treatment on the basis of the facial pattern and an estimate of its growth”. *The Angle Orthodontist* 27.1 (1957): 14-37.
10. Ricketts R. “Cephalometric Analysis and Synthesis”. *The Angle Orthodontist* 31.3 (1961): 141-156.
11. Gervasio L and Gómez E. “Relationship of the cephalometric angle NAP with the Ricketts Aesthetic Line, in two patients submitted to Orthognathic surgery”. *Latin American Journal of Orthodontics and Pediatric Dentistry* (2006).
12. Brunelle J., *et al.* “Prevalence and distribution of selected occlusal characteristics in the US population, 1988-1991”. *Journal of Dental Research* 75 (1996): 706-713.
13. Barahona J and Benavides J. “Principal Cephalometric Analyzes Used for Orthodontic Diagnosis”. *Scientific Dental Journal, Costa Rica* (2006).
14. Montoya D Gurrola and B. Mendoza J. “Evaluation of the aesthetic plane of Ricketts in patients with extractions of first premolars”. *Latin American Journal of Orthodontics and Pediatric Dentistry*.

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